ATTACHMENT 8

PREPAREDNESS AND PREVENTION

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ACRONYMS

ACAMS	Automatic Continuous Air Monitoring System
BRA	Brine Reduction Area
BRS	Burster Removal Station
BSA	First Floor Buffer Storage Area
BSRM	Burster Size Reduction Machine
CAIRAP	Chemical Accident/Incident Response and Assistance Plan
CAL	Chemical Assessment Laboratory
CAMDS	Chemical Agent Munitions Disposal System
CFR	Code of Federal Regulations
CHB	Container Handling Building
CO	Carbon monoxide
CO_2	Carbon dioxide
Composition B	60% RDX, 39.5% TNT, 0.5% Calcium Silicate
DAAMS	Depot Area Air Monitoring System
DCD	Deseret Chemical Depot
DFS	Deactivation Furnace System
ECR	Explosive Containment Room
ECV	Explosive Containment Room Vestibule
GB	Sarin, Isopropyl methylphosphonofluoridate
H	Levinstein mustard, bis (2-chloroethyl) sulfide
H_2O	Water
HD	Distilled mustard, bis (2-chloroethyl) sulfide
HT	Mustard, 60% HD and 40% T
LIC	Liquid Incinerator
MDB	Munitions Demilitarization Building
MIN	Mine Machine
MPF	Metal Parts Furnace
N_2	Nitrogen
NFPA	National Fire Protection Association
NO	Nitrogen oxide
NO_2	Nitrogen dioxide
PAS	Pollution Abatement System
PLC	Programmable Logic Controller
PMD	Projectile/Mortar Disassembly Machine
PPE	Personal Protective Equipment
RDX	Cyclotrimethylenetrinitramine
RHA	Residue Handling Area
RSM	Rocket Shear Machine
SDS	Spent Decontamination Solution; Spent Decontamination System
T	Bis[2(2-chloroethylthioethyl)] ether
TEAD	Tooele Army Depot
TMA	Toxic Maintenance Area
TOCDF	Tooele Chemical Agent Disposal Facility
TOX	Toxic Cubicle
UPA	Unpack Area
UPMC	Upper Munitions Corridor
VX	O-ethyl-S(2-diisopropylaminoethyl) methyl phosphonothiolate

8.1 DOCUMENTATION OF PREPAREDNESS AND PREVENTION REQUIREMENTS [R315-8-3.3; R315-8-3.6]

8.1.1 Equipment Requirements

8.1.1.1 The Tooele Chemical Agent Disposal Facility (TOCDF) maintains an extensive inventory of emergency equipment. Telephone and public address loudspeakers are available throughout the facility and in all work areas for use in case of emergencies. The telephone system is available for internal as well as external communications. Portable fire extinguishers, a sprinkler system, and a halon system are all built into the facility to minimize the threat of fire. Attachment 5 (Inspection Plan) contains lists of emergency equipment that are inventoried on a regular basis. Attachment 9 (Contingency Plan) contains a list of additional emergency equipment available from Deseret Chemical Depot (DCD) and Tooele Army Depot (TEAD).

8.1.1.2 Pumps are installed at the existing wells to produce the anticipated 616,000 gallons per day required at Deseret Chemical Depot (DCD). The well pumps supply water to two reservoirs (with a combined capacity of one million gallons). These reservoirs supply the water distribution system at DCD. These reservoirs provide sufficient water for operations at the TOCDF and the fire water requirement of 330,000 gallons. All water storage tank system components are designed to meet National Fire Protection Association (NFPA) standards.

8.1.2 Aisle Space Requirements

8.1.2.1 The Container Handling Building, (CHB), Unpack Area (UPA), Explosive Containment Room Vestibule (ECV), the Upper Munitions Corridor (UPMC), the S-2 warehouse, and the Toxic Maintenance Area (TMA) will be used for container storage. The storage areas are arranged to provide efficiency in container storage; to provide adequate access for fire-fighting and proper maneuvering of a forklift (except in the ECV and UPMC); to meet minimum fire code requirements; and to allow easy access for personnel and equipment, which is needed for inspections and emergency operations.

8.1.2.2 The CHB stores the munitions before demilitarization processing. There is a minimum of 2.5 feet of aisle space associated with the containers stored in the TMA Container Storage Area and the S-2 warehouse. An aisle space will be available for fork lift operation in the S-2 warehouse. There is a minimum of six feet of aisle space between overpacks (On-site Containers (ONCs), spray tank overpacks) stored in the CHB. There are no aisle space requirements for the containers stored within an overpack. Aisle space within an overpack is not relevant or needed since the overpacks are monitored and, if a release is detected, the overpacks and leaking munitions are managed as described in Attachment 12 (Containers).

8.2 PREVENTIVE PROCEDURES, STRUCTURES, AND EQUIPMENT [R315-3-2.5(b)(8)]

8.2.1 Loading/Unloading of Hazardous Waste [R315-3-2.5(b)(8)(i)]

8.2.1.1 The wastes managed at the facility are described in Attachment 2 (Waste Analysis Plan). The scrubber brines are pumped from the incinerator scrubber towers to the brine tanks before they are fed to the brine dryers. The SDS is collected in sumps, pumped to the spent decontamination tanks, and then transferred to the Liquid Incinerator (LIC). The GB sodium hydroxide-based spent decontamination solution may be shipped off site if the requirements in the Attachment 2 (Waste Analysis Plan) are met.

8.2.1.2 The munitions and bulk containers are delivered to the CHB in overpacks via transport truck. They are unloaded from the transport truck and placed in the CHB. From the CHB, the munitions are transported by a conveyor to a lift system and then on a conveyor to the Munitions Demilitarization Building (MDB). There they are unloaded in the Unpack Area (UPA) where processing begins.

8.2.1.3 The brine dryer salts are discharged directly to containers. The filled containers are covered and labeled. The containers of salt are then moved via forklift to the Residue Handling Area (RHA), where they await transportation to an approved hazardous waste management facility.

8.2.1.4 The incinerator ash and residue are handled in the same manner as the salts. These wastes, like the salt, are discharged directly to containers. The spent charcoal from the ventilation system is removed from the ventilation system by personnel in Personal Protective Equipment (PPE) clothing. The charcoal is placed in containers that are compatible with the material to be stored and meet or exceed the requirements stated in R315-8-9.3 and R315-7-16.3.

8.2.1.5 The following procedures will be followed when transferring residue from the Deactivation Furnace System (DFS) cyclone to the associated receiving container to minimize fugitive emissions and ensure proper management:

8.2.1.5.1 The transfer funnel that is used to connect the cyclone discharge pipe to the receiving container will be sealed (e.g., via duct tape, etc.) to the receiving container and the cyclone discharge pipe.

8.2.1.5.2 The building that encompasses the DFS cyclone discharge will be kept closed except when inspecting the receiving container and discharge area, entering and exiting the building for operation and maintenance, and moving containers into and out of the building.

8.2.1.5.3 The interior of the building will be monitored for the presence of agent prior to opening.

8.2.1.5.4 The building shall be ventilated to the MDB ventilation system when the DFS is operational or when waste is present in the cyclone discharge building.

8.2.1.5.5 Unless the Permittee demonstrates that the agent concentration of a sample of the residue generated from the operation of the DFS Cyclone is below 20 ppb for GB or VX, or below 200 ppb for H/HD/HT, the residue must be placed into permitted storage.

8.2.2 **<u>Runoff [R315-3-2.5(b)(8)(ii)]</u>**

8.2.2.1 Runoff from all hazardous waste handling areas to other areas of the facility or the environment is prevented by facility design features. Waste handling in the CHB, MDB, RHA, and Brine Reduction Area (BRA) takes place in enclosed buildings. These measures should minimize the potential for precipitation runoff to reach these areas. The waste handling areas of the CHB, MDB, and the BRA have sumps for collection of spilled hazardous waste. The floor sumps for all toxic management areas of the MDB have provisions for transferring sump contents to spent decontamination tanks (see Section 8.2.6). The other areas have passive sumps, which are pumped dry when liquids accumulate in them.

8.2.3 **Water Supplies [R315-3-2.5(b)(8)(iii)]**

8.2.3.1 The processing and storage of all hazardous waste (including brine drying and salt storage) at the facility takes place in enclosed structures with concrete bases that prevent the downward percolation of wastes or liquids.

8.2.4 **Equipment and Power Failure [R315-3-2.5(b)(8)(iv)]**

8.2.4.1 **Equipment Failure Control**

8.2.4.1.1 The process control system is designed and operated to perform shutdown of the entire facility or a portion of the facility should an equipment failure (or other emergency) occur. The control room has a positive-pressure, filtered supply air system providing protection against toxic fumes that could be emitted during an emergency. A detailed description of the centralized control system is provided below.

8.2.4.1.2 The centralized process control system uses process controllers with functional keyboard or keyboards for operator interface and control of the system as required, control screens for displays, a printer to print out alarms and messages, and an event recorder or data logger. This equipment is installed in the Control Room and is defined as the Master Control Station. Contained in the process controller are the programs for each type of munition demilitarization machine throughout the facility and process-supporting facilities, such as utilities. An operator can remove a unit or piece of equipment from automatic control and control it manually through the keyboard on the console. The control system is designed as a fail-safe system. All local controllers communicate with the central control on a real-time basis. Should this communication link become inactive (presumably from a failure in the central control), the local controls automatically shut down to a safe mode. The communication system described previously is a redundant system to reduce the likelihood of this occurring as a result of a failure in the communications link.

8.2.4.1.3 Initialization of the control system is necessary before munitions processing can begin. The initialization procedure resides within the process controller; the actual initialization is a semiautomatic operation. When the initialization has been successfully completed, the operator is notified via the control screen, which indicates that all permissives have been received and the system is now ready to process that type of munition. Any problems that may arise during the initialization are displayed on the control screen of the appropriate control room work station.

8.2.4.1.4 Before processing munitions, each system is pre-checked by a test program from within the process controller.

8.2.4.1.5 After initialization and performance verification, a second level of performance verification is conducted by the process controller; this verifies the presence of any shutdowns and any permissive interlocks. Having met all performance verification checks, a message appears on the control screen and printer that the munitions processing equipment, as viewed by the process controller, is ready for operation.

8.2.4.1.6 After start of the system has been initiated, automatic operation follows, as long as all individual steps occur within their predetermined parameters and no shutdown signals occur. If a step or function does not occur within its predetermined parameters, a message appears on the control screen and on the printer; the operator shall take corrective action.

8.2.4.1.7 Shutdown requests and interlocks are monitored. Where possible, applicable pre-alarms or indications that a shutdown condition is imminent are used. This gives the operator time to prevent a shutdown or to be prepared for it. Interlocks are developed to respond to various conditions in a manner applicable to the condition and equipment. As an example, some shutdowns are immediate, others are orderly. The system logs conditions, such as starting and stopping of equipment.

8.2.4.1.8 In addition to the process control system, equipment such as furnaces, boilers, and airlock doors in the UPA and each load station have a local control panel that offers limited control. Local control panels offer the capability of operating in conjunction with the Master Control System or independently for maintenance purposes. Areas such as the UPA or incinerator require a semiautomatic operation, either during normal operation or startup. In the semiautomatic mode of operation, the Master Control System may start a unit and wait for the next step to be initiated and controlled by an operator before proceeding to the next logic control step.

8.2.4.2 **Incineration Upset Control**

8.2.4.2.1 A control system provides continuous automatic control of the incineration process. System interaction by the operator is limited to startup or shutdown of process systems or waste feed and reaction to abnormal conditions. In monitoring critical functions, the process control system gives advanced warning of alarms where possible, indicating that a critical or hazardous condition is developing and warning operators in time to take action. Interlocks are provided to respond to various conditions. Shutdown can be immediate or staged.

8.2.4.2.2 All incinerators have automatic waste feed cutoff systems as specified in Attachment 19 (Instrumentation and Waste Feed Cut-Off Tables).

8.2.4.3 **Emergency Power**

8.2.4.3.1 The emergency power systems are described in Attachment 9 (Contingency Plan).

8.2.5 **Personnel Protection Equipment [R315-3-2.5(b)(8)(v)]**

8.2.5.1 Various levels of protective clothing are required at the facility to protect workers from the effects of the agent in the work environment. The type of protective clothing worn by the workers is based on the level of protection required by the location, the process, and the type of agent. Selection of proper PPE is addressed in Attachment 9 (Contingency Plan).

8.2.6 **Spent Decontamination Collection System [R315-3-2.5(b)(8)(iii)]**

8.2.6.1 In all category A and B areas, as well as in some category C areas, spent decontamination sumps and pumps are designated and provided to collect any liquid from that area and pump it to one of the SDS storage tanks in the Toxic Cubicle (TOX).

8.2.6.2 All primary sumps are constructed of steel and surrounded by an epoxy coated external concrete liner. Secondary sumps are constructed of epoxy-coated concrete. The compatibility of materials has been considered when designing these sumps. There are no incompatibility problems with the selected materials and anticipated decontamination solutions or other such wastes. Attachment 16 (Tank Systems) contains a detailed description of the TOCDF sump system.

8.2.7 **Agent Monitoring Equipment [R315-3-2.5(b)(8)(vi)]**

8.2.7.1 Chemical agents are routinely managed at the facility. The safe operation of the facility requires that personnel be protected from accidental or inadvertent exposure to these agents. The ventilation system minimizes worker exposure to agents. To supplement the ventilation system, an agent monitoring system is provided to alert facility personnel to the presence of agents.

8.2.7.2 The agent monitoring equipment includes the Automatic Continuous Air Monitoring System (ACAMS) and the Depot Area Air Monitoring System (DAAMS). Attachment 22 (Agent Monitoring Plan) provides more information on each system, including a general description of the system, its theory of operation, and its sensitivity and response time.

8.2.7.3 In addition to the agent monitoring equipment, detector paper may be used as a confirmatory test for identifying GB, VX, and H series agents in suspect liquids. This paper does not detect vapors or extremely small droplets of GB, VX, or mustard agents and may change color in the presence of other chemicals.[1]

8.3 **PREVENTION OF IGNITION OR REACTION OF IGNITABLE, REACTIVE, OR INCOMPATIBLE WASTE**

8.3.1 **Precautions to Prevent Ignition or Reaction of Ignitable or Reactive Waste [R315-3-2.5(b)(9) and R315-8-2.8(a)-(c)]**

8.3.1.1 Ignitable waste at the facility includes waste generated at the Chemical Assessment Laboratory (CAL) and subsequently stored in the S-2 warehouse. No sources of ignition will be allowed in the S-2 warehouse when ignitable items are stored. Potential sources of ignition to be prohibited include: open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical, or mechanical), spontaneous ignition

[1] Army Regulation 50-6, Nuclear and Chemical Weapons and Material, "Chemical Surety Program," Headquarters, Department of the Army, Washington, D.C., 15 January 1984.

(e.g., from heat producing chemical reactions), and radiant heat. "No Smoking" signs will be placed at the entrances to the S-2 warehouse.

8.3.1.2 No treatment of wastes within the containers in the S-2 warehouse will occur (i.e., S-2 warehouse will be used for storage only). This fact, coupled with the procedures identified in paragraph 8.3.4 regarding management of incompatible waste and the procedures identified above regarding the management of ignitable, will prevent the types of reactions described in R315-8-2.8(b).

8.3.1.3 Reactive wastes at the facility include chemical agents by EPA characterization, explosives, propellants, and certain active ingredients in the fuzes. No precautions are taken by the facility to protect reactive wastes from contact with the water from the automatic sprinkler system. The explosives, propellants, and fuze components were originally produced in a water solution, are compatible with water, and dissolution in water reduces the reactivity hazard of these components, so no special precautions are necessary to prevent contact with water.

8.3.1.4 The demilitarization process and operations in the MDB are designed to prevent accidental ignition or reaction of agent, explosives, and propellants. The entire building is a designated non-smoking area. During munition processing, all equipment is grounded to prevent the transfer of electrostatic charges to the munitions.

8.3.1.5 Handling procedures have been incorporated into the transportation and plant operation procedures to apprise personnel of the importance of handling the munitions and bulk containers. Conveyors and charge cars are used to transport munitions and their components within the MDB. The conveyor incorporates stops, interlocks, and guard rails that prevent the munitions and components from falling.

8.3.1.6 The facility is protected from fires and explosions potentially caused by functioning munitions, electrical shorts, fuel leaks, overheated equipment, or miscellaneous equipment and operator failures by a fire protection system designed to meet the special needs of the plant areas. The fire protection system for the MDB includes: (1) automatic fire detectors throughout the building (smoke, thermal, and photoelectric types); (2) manual fire alarm pull stations at exit points from the various hazard areas of the building; (3) fire protection water; (4) an automatic sprinkler system for the UPA; (5) automatic total flooding Halon systems to protect the Control Room, Control Room Support Area, and Power Room; and (6) portable fire extinguishers located throughout the building (except in category A and B areas). A detailed description of the building fire protection system is provided in Attachment 9 (Contingency Plan).

8.3.1.7 The explosive components of munitions are removed by either the mine machine, rocket shear machine, or the projectile/mortar disassembly machine, in the Explosive Containment Rooms (ECRs). There is also a burster size reduction machine in the containment room when projectiles are being processed. The containment rooms feature reinforced concrete enclosures designed to totally contain the effects of an accidental explosion. These areas are unmanned during normal operations.

8.3.1.8 The probability of an explosion occurring in the DFS is low. The system is designed, however, so that the effects of an explosion within the incinerator are minimized, and the system's barrier (room) is designed to contain the explosive effects of an explosion in the system (similar to the ECRs). Material entrance to the retort is accomplished via the blast gate valve, which isolates the retort in case of an explosion. Again, this normally is an unmanned area.

8.3.1.9 The agent in the munitions is removed by either the mine drain station, rocket drain station, multipurpose demilitarization machine, or the bulk drain station. These areas are protective clothing areas and normally are unmanned during processing operations. The probability of reaction of the agents is low because of the contained design of the drain stations and the compatibility of the materials in the plant. If a reaction of agents occurs, the system has been designed to contain all gases.

8.3.1.10 An incident or accident involving an explosion is regarded as a serious event. If such an event should occur, processing of munitions will be safely halted and the plant will be shut down at a point where the munitions are secured. Startup shall not occur until the cause of the explosion is determined, a corrective action is implemented as necessary, and Executive Secretary approval is received.

8.3.1.11 Detonations are not a planned technique for chemical demilitarization. A detonation will be handled by preplanned response in the contingency plan and the installation's Chemical Accident/Incident Response and Assistance Plan (CAIRA Plan).

8.3.1.12 The definition of major detonation includes personnel injuries. The TOCDF regards any incident that results in any personnel injury from handling munitions as unacceptable, requiring corrective action. The occurrence of any detonation in the course of demilitarization of chemical munitions is unacceptable and requires corrective action.

8.3.1.13 The possibility of a death from a detonation is included in the definition of a major detonation, and operating procedures are designed to minimize this possibility.

8.3.1.14 Both fire fighting and evacuation are possible options in an emergency situation. If the fire involves explosive materials or is supplying heat to explosives, or if the fire is so large that it cannot be extinguished with the equipment at hand, the personnel involved shall evacuate and seek safety.

8.3.1.15 The fire protection system does provide protection against and immediate response for a situation involving fire inside the building. The fire protection system will provide protection by extinguishing a Class A fire involving dunnage in the UPA. The fire protection system will provide protection against the spread of a fire to a pallet of munitions in the UPA and allow time for operators in the UPA to evacuate the area. The fire protection system will provide cooling and a degree of protection to munitions in the ECV and ECR from a fire that gets started away from the munitions. While the fire protection system does not provide a primary defense against a detonation of a munition, the system in connection with the blast resistant structure of the ECR and the compartmentalization of the ECV, UPA, Control Room, and incinerators does provide protection against the spread of fire from an explosive accident.

8.3.1.16 By design, the only fires allowed inside of the MDB are to be contained within the furnaces. A fire in any other part of the plant is regarded as a serious event requiring immediate attention and corrective action. Because a fire that exposes energetic materials in the munitions can cause an explosion and/or rapid spreading of the fire, no distinction is to be made between "small" fires, "smoldering" fires, "large" fires, "dunnage" fires, or "explosives" fires. All fires inside the building are to be reported immediately and corrective action instituted immediately.

8.3.1.17 Since any fire inside the building will consume oxygen and generate gases that cannot support life within a given enclosed space, it is imperative that the presence of a fire be communicated rapidly and traffic into an affected area be restricted to only those personnel prepared to fight a fire safely. Again, no distinction is to be made between "small" or "large" fires, or the type of fire. Immediate response to communicate the presence of a fire and immediate corrective action is mandatory.

8.3.1.18 The ECR and the associated equipment are designed to be operated remotely, unattended by operators. In the normal course of events, there will be no personnel inside the ECR while munitions are present.

8.3.1.19 When repairs must be performed near explosively configured munitions or munition jam-ups, the demilitarization process will be stopped and adequately protected personnel may manually remove the munition(s) from the work area. The munitions can be moved to the UPA, ECV, or the First Floor Buffer Storage Area (BSA) until startup procedures can be initiated. With the explosively configured munitions removed from the work area, maintenance personnel can work on process equipment without the possibility of accidental munition detonation.

8.3.1.20 If an explosion occurs in a containment room, it is expected that a portion of the agent will be combusted while the remainder will exist in a vapor or liquid form. In the ECR, the agent vapors will be contained in the room because both the blast valves and the leak-tight dampers will be closed. The blast valves will remain closed until the pressure decays to the point where the spring force is greater than the room pressure (0.5 psi). At this pressure, the blast valve will open, but the leak-tight damper will continue to contain the gases. The leak tight dampers will not be opened until the room gas pressure has decayed to approximately atmospheric pressure.

8.3.1.21 High gas pressure in the DFS kiln will be vented through an attenuation duct, then through the afterburner and Pollution Abatement System (PAS). The attenuation duct will reduce the gas pressures resulting from shocks so that an explosion will not violate the structural integrity of the afterburner or the PAS.

8.3.1.22 The ECRs were designed to have a leakage rate of no greater than 300 cubic feet per minute. The ECR is completely surrounded by rooms that are ventilated to the filter system. Therefore, any leakage out of the ECR as a result of a blast will be vented to the filter system.

8.3.1.23 Liquid agent in the ECR resulting from an explosion will be collected in the ECR sump. Because of the limited number of munitions that will be in the ECR at any one time, the amount of liquid agent released by an explosion is not expected to be greater than about two gallons. Once ventilation has been reestablished in the ECR (by reopening the gas tight valves), Demilitarization Protective Ensemble (DPE) entries will be made and the area will be hosed down with decontamination solutions. Sufficient decontamination solution will be used to ensure complete neutralization of the agent. The resulting waste liquids will then be pumped to the spent decontamination holding tank system for later incineration in one of the two LICs. The GB sodium hydroxide-based spent decontamination solution may be shipped off site if the requirements of Attachment 2 (Waste Analysis Plan) are met.

8.3.1.24 There is a remote possibility of a detonation in the DFS. This possibility is minimized by controlling the DFS retort temperature below a point where the explosive components would be expected to detonate. The possibility of a detonation is further reduced by spacing energetics on the feed conveyors and separating materials inside the retort by spiral flights, so that a detonation on one flight cannot propagate to other flights and cause a sympathetic detonation.

8.3.1.25 The possibility of a detonation is further minimized by shearing rocket motors and bursters into pieces, open at both ends, so that combustion initiates at both ends of a cylindrically shaped propellant or burster and there is no net force to cause acceleration of a work piece in any axial direction. Bursters from large projectiles (155-mm and 8 inch) are sheared into pieces to increase the surface area available for combustion and to reduce the size of the pieces so that combustion does not auto accelerate to a detonation (i.e., the fuel burns itself out before a supersonic pressure wave in the burning fuel can be established).

8.3.1.26 The energetic materials, because of their chemical composition, are expected to generate heat (2,000 to 4,000 Btu/lb) and evolve gases (CO, CO_2, H_2O, NO, NO_2, N_2) rapidly, a process generally described as deflagration. This rate is designed into the size of the retort, ductwork, and induced draft fan so that it can be controlled safely and effectively. This design concept has been proven effective in furnaces burning explosives and propellants from conventional munitions in several places across the country.

8.3.1.27 If a detonation should occur in the DFS, the operation of the afterburner will be protected by the Blast Attenuation Duct in the ductwork between the retort and the cyclone, and secondarily by the cyclone separator. Discharge of combustion gases from the heated discharge conveyor is prevented by two blast gates in series at the discharge end of the heated conveyor. Fugitive emissions from the retort seals will be controlled by capturing the emissions inside a shroud surrounding the retort and recycling the emitted gases back into the retort or exhausting the gases to the ventilation filter system before they are discharged to the atmosphere. The room surrounding the DFS retort is a blast resistant structure and is separately vented to the ventilation filter system to control any vapors from inside of the building.

8.3.1.28 These controls of feed rate, feed preparation, operating parameter controls, and design to control fugitive emissions from the DFS are adequate to safely manage chemical munitions in the TOCDF.

8.3.1.29 If the DFS should shut down, the interlocking system managed by the computer control system will simultaneously stop the processing of munitions in the ECR. Feed to the ECR will stop, and the transfer of munitions to the ECV and UPA will stop until the furnace can be restarted. This will preclude a buildup of munitions components at the retort entry. The feed chutes will continue to be monitored for a high temperature and water will be sprayed into the feed chute to cool the chute and any pieces that are present in the feed chute to prevent an explosion.

8.3.1.30 The ECR area ventilation category will remain at Category A once the blast valves and the leak type valves are opened after a detonation. The area surrounding the ECR will also remain at category A. Before any entries are allowed in the ECR after a detonation occurs, the room air will be monitored to determine the agent concentration.

8.3.1.31 The DFS ventilation category will remain at category B because no agent will be present other than what is expected. The room air will be monitored to determine the agent concentration before any entries will be allowed in the DFS after a detonation occurs.

8.3.1.32 The Burster Size Reduction (BSR) machine is the shear station of the Rocket Shear Machine (RSM) modified with the Burster Size Reduction kit. The BSR receives projectile bursters from the Burster Removal Station (BRS) of the Projectile/Mortar Disassembly Machine (PMD). The burster is conveyed by the BRS gripper to the BSR feed chute. Bursters are fed into a special die that is designed to hold the burster in place during the shear blade cycle. Except for bursters from 4.2-inch mortars and 105-mm projectiles, which are open on one end, the burster is sheared to preclude an explosion during burning and drops into the DFS feed chute. The machines for burster (and rocket) shearing are limited in the amount of force that can be applied and the speed at which they move to preclude application of a shock load of sufficient energy to initiate the energetic materials in the burster (or rocket). The operation is conducted within an area of the plant designed to contain the explosive effects of a detonation if this remote possibility occurs.

8.3.1.33 The possibility of a detonation of the M55 or M23 mine during chemical agent removal raised concerns about the high pressures and potential ruptures to which the agent piping might be exposed. The blast loads that must be contained are shock waves, quasistatic gas pressure and primary and secondary fragments. The shock waves are short duration, high pressures that range up to approximately 900 psig. The quasistatic gas pressure caused by the heating of the gas as a result of combustion will reach as high as 26 psig. The fragments will be generated by the munition casing. The ECR is designed with blast shields used to cover and protect the piping and electrical penetrations. If exposed agent piping is in the direct line of sight of the blast, the piping could be damaged by either the shock or the fragments. But, if the agent piping is behind the blast shield, it will be protected from damage. This shock pressure does not translate directly into hydraulic pressure because of its duration. Also, the shock pressure indicated above does not take into account the equipment and structure in the ECR. The equipment and structure will absorb part of the energy from this detonation, resulting in greatly reduced shock pressures. It is expected that the hydraulic pressure in the agent pipe will not exceed the design pressure for that pipe. The quasistatic pressure does translate into hydraulic pressure, but the hydraulic pressure will not exceed the design pressure of the pipe. Fragments will have no effect on agent piping outside of the ECR. To provide additional assurance that explosions will not damage the agent lines outside of the ECR, quick response valves were installed in the agent lines after the lines exit the ECR. The response time of these valves is between 50 and 75 milliseconds. Based on this discussion, rupture of the agent piping outside of the ECR is not expected. Also, it should be noted that all agent piping outside of the ECR that carries agent runs only through ventilation category A areas where the facility was designed to handle spilled agent.

8.3.1.34 The lower blast gates in the feed chutes to the DFS retort are driven by double acting pneumatic cylinders. Proximity switches that sense the position of the cylinder in the open or closed positions are located at each end of travel of the cylinders. These are labeled ZS-01A, ZS-01B, ZS-02A, and ZS-02B. If a blast gate is to be closed but the position switches do not confirm that the blast gate is closed, the interlock will open and an alarm will be given to the operators that the blast gate did not close. This would be the first indication that a piece is caught in the blast gate guides. Confirmation of this is available with the jam sensors XS-207, XS-208, XS-209, or XS-210.

8.3.1.35 There are two temperature sensors located in each feed chute TE-150, TE-202, TE-154, and TE-203 that will alarm if a high temperature condition is reached in this area between the blast gates. A high temperature would cause water to be sprayed into this area to cool the chute and work pieces in the chute.

8.3.1.36 The safety features built into this system are:

8.3.1.36.1 The blast gates move slowly so that should the gate impact a fuze or burster piece there is not enough kinetic energy transferred to cause detonation.

8.3.1.36.2 The high temperature switches are set below the temperature at which the energetic materials would start to deflagrate. Typically this temperature is above 200° C (392° F).

8.3.1.37 Since the operational steps of the blast gates are event driven, the program will not allow the operation to advance to the next step until the current step has been completed. In the case of the blast gates, before each cycle step can proceed, feedback from the limit switches on the gates must be received at the Programmable Logic Controller (PLC). The PLC not only looks at the current state of the limit switch, it also verifies that the switching takes place in the proper sequence. If this signal is not received, an alarm is received in the control room and the ECR operations are halted.

8.3.1.38 The blast gates that feed the DFS from the ECR are designed to prevent the propagation of the blast effects from the area where any blast occurred by ensuring that at least one blast gate between these areas is closed at any time. At certain times during explosive feed to the DFS, there may be a burster and small amounts of agent between two gates that are closed. Effects of a detonation during this time are expected to be minimal because both gates are designed to withstand a blast of this magnitude.

8.3.1.39 Agent vapors evolving in the ECR are removed to the filter system and vapors evolving in the DFS will be incinerated in the furnace or will be removed by the room filter system.

8.3.1.40 When the blast gates in the ECR do not close completely, operations within the ECR are automatically halted.

8.3.1.41 A detonation in the retort would be sensed by pressure sensors/transmitters at the discharge end of the retort, PIT-18, and in the exhaust duct, PIT-168. The retort is fabricated with a spiral flight which separates the solid materials into discrete segments. If a detonation should occur in one segment, the flight will inhibit propagation to adjacent segments, limiting the amount of material that explosively combusts. If a detonation should occur that causes a severe overpressure, feed to the retort would be stopped immediately, munitions processing upstream of the DFS would be stopped, the retort burner would be shut down, and the retort oscillated to allow the inventory of material in the retort to burn out. Any vented air is treated in the carbon filters to control vapor emissions from the plant before being released to the atmosphere.

8.3.1.42 The DFS barrier and ducts exiting the barriers have been designed to withstand detonations. In the unlikely event that there is an explosion, that detonation will have very little effect on the afterburner. The shock wave from the rotary kiln would have to travel through ducting that will dissipate the energy to prevent stress until it exits the building. Once the duct leaves the building, it enters an attenuation duct that will significantly lower the shock pressure. From the attenuation duct, the duct runs to the cyclone, then to the afterburner. At this point, the blast pressures have decayed to barely noticeable levels that would not affect the afterburner operation or cause afterburner flameout.

8.3.1.43 If a blast is detected, the Deactivation Furnace System afterburner will be shut down in an orderly manner and the room air will be diverted to the filter system. The hazard analysis addressed the concern of reaching an explosive level as a result of combustibles in the Deactivation Furnace System barrier and it was concluded that this level would not be reached with the designed air flows in that room.

8.3.1.44 The booster of the M23 mine contains 172.5 grains (11.2 grams) of RDX explosive. In testing with drop weight sensitivity apparatus, a two kilogram weight must be dropped from a minimum of nine inches in order to cause RDX to explode. The punch machine used for dislodging the booster pellet from the mine body is limited to provide only a small fraction of the energy necessary to initiate the RDX booster. This mechanical limitation prevents the booster pellet from being initiated and then initiating the burster.

8.3.1.45 The burster in the M23 mine is a cast explosive; powder and dust are not expected to be a concern. Composition B is less sensitive than RDX to impact initiation and the design of the punch will prevent initiation by impact as described above. Differential thermal analysis of Composition B shows endothermic reaction between about 36° C and 120° C (86° F to 248° F). Exothermic reactions appear to begin somewhere above 120° C. If the punch machine should approach 100° C, it could stop working because of the mechanical limitations in the design. Thermal gravimetric analysis of Composition B shows this material to be stable up to 120° C. The design of the Mine Machine (MIN) is adequately conservative to preclude initiation of RDX or Composition B.

8.3.1.46 If an explosion or other energetic accident should occur during the punch operation (or any other step in mine demilitarization), it would be contained in the ECR. The cleanup of such an event will proceed as has been previously described.

8.3.1.47 The burster well in projectiles is a metal tube that contains the burster. When the projectiles are being demilitarized, the fuze, booster, and burster are removed from the projectiles remotely in the ECR. The burster is removed from the burster well by applying air pressure to the back of the burster and pneumatically forcing the burster out of the well. A clamp, specially designed to limit clamping pressure, grabs one end of the burster and withdraws it from the well. Bursters are conveyed to the BSRM feed chute by the BRS gripper. At no time at this step of the process is the burster well clamped or held from the outside, so there is no possibility of crimping the burster well with the burster inside of the well. If, for some reason, the burster cannot be removed from the well, the projectile is not processed further, but is rejected and loaded onto a tray specifically designated for rejected projectiles and is set aside for special handling.

8.3.1.48 After the explosive components are removed from the projectile, the empty burster well is removed from the projectile, crimped, and placed back in the projectile. The crimping machine has been designed to deform an empty, thin wall cylinder that requires a low hydraulic pressure.

8.3.1.49 If an accident should occur during the course of demilitarizing projectiles, the size of the event is strictly limited to the number of projectiles inside the ECR at any time. If an accident should occur, the event will be contained within the ECR and cleanup would be implemented as described previously.

8.3.1.50 The force used to remove fuzes from projectiles is insufficient to cause an explosion. The fuze removal operation is used for two fuze types: M8 fuze for 4.2 mortars and the M503/557 fuze for 105mm projectiles. This operation is done under undue force conditions which, by definition, are less than a force required to deform the explosives either in the fuze or in the bursters. The burster material of the mortars is tetryl; the burster material of the 105mm projectiles is composition B.

8.3.1.51 There is a finite, albeit small, probability that the burster well may have been thoroughly corroded by the combined action of chemical agent on the outside of the burster well and the cast solid explosive on the inside of the burster well. In the course of storing and managing chemical weapons over the past 60 years and demilitarizing projectiles at the Chemical Agent Munitions Disposal System (CAMDS) plant since 1979, the Army has not had any indication that the possibility of burster well corrosion is a significant concern.

8.3.1.52 If a corroded burster well is uncovered by fuze and burster removal, a leak of 1.6 lb of agent GB from the 105mm projectile, 11.7 lb of mustard agent from a 155mm projectile, 6.5 lb of agent GB from a 155 mm projectile, 6.0 lb of agent VX from a 155 mm projectile, or 6.0 lb of agent HD/HT from the 4.2 inch mortar projectile is possible inside of the ECR. The leak would be contained within the ECR. Any evolved vapor would be carried by the ventilation air to the carbon filters where the vapor would be absorbed onto carbon. The ventilation filter system has been designed to safely treat the air swept over a spill covering 96 square meters continuously for 449 hours. The filter system can safely handle the evolved vapors until the ECR can be emptied of munitions and the spill treated with decontamination solution.

8.3.1.53 After the burster is removed from a leaking projectile or the burster and propellant are removed from a leaking mortar cartridge, the burster well is removed, the agent is removed by pumping out the cavity of the projectile, the burster well is crimped to prevent a tight reseal, and the projectile body and burster well are loaded onto a tray to be treated in the Metal Parts Furnace (MPF). The agent is pumped to the agent storage tanks in the TOX and is incinerated in one of the two LICs. After treatment in the MPF at a temperature and time sufficient to destroy any remaining agent contamination, the metal that remains will be managed in accordance with Attachment 2 (Waste Analysis Plan).

8.3.1.54 The rocket fuzes will be fed through the blast gates to the DFS. There will always be a minimum of one flight separation between rocket fuzes and bursters.

8.3.1.55 It is the basic requirement that the M8 and M508/557 fuzes have two independent interlocks that are always turned to a safe position and the fuze train is interrupted. Either of these interlocks is capable of preventing an unintended detonation before the ammunition is projected. An explosive train develops a detonation by progression of the reaction from an explosive of greater sensitivity but minimal quantity, to the explosives of least sensitivity (bursters). Without this train of explosives, a high yield detonation cannot be achieved. The interlock devices interrupt the explosive train so that should an explosive function occur on the side of the device (i.e., thermal initiation in a furnace), the explosives on the other side of the device will not be affected.

8.3.2 General Precautions for Handling Ignitable or Reactive Wastes or Accidently Mixing Incompatible Wastes [R315-3-2.5(b)(9) and R315-8-2.8(b)

8.3.2.1 General precautions for handling ignitable and reactive waste are discussed above. With the exception of the wastes stored in the S-2 warehouse, none of the hazardous wastes are ignitable or potentially incompatible. Procedures which prevent mixing of incompatible wastes in the S-2 warehouse are provided in section 8.3.4.

8.3.3 Management of Ignitable or Reactive Wastes in Containers [R315-3-2.6(c) and R315-8-9.7]

8.3.3.1 The salt to be stored in containers is neither ignitable nor reactive. Therefore the requirements of R315-3-2.6(c) and R315-8-9.7 are not applicable to this waste. The containers of agent, explosives, and propellants are not ignitable and are managed so that water contact is minimized. This same practice is adhered to if other wastes, such as the incinerator ash or residue, are found to be reactive because of the presence of sulfides or inorganic fluorides. All containers holding reactive or ignitable wastes will be located at least 50 feet from the facility property line.

8.3.4 Management of Incompatible Wastes in Containers [R315-3-2.6(d) and R315-8-9.8(a)(2)]

8.3.4.1 No incompatible hazardous waste shall be managed at the CHB. Munitions and bulk containers with only one agent type may be processed at one time.

8.3.4.2 Containers with incompatible site-generated wastes shall not be placed on a secondary containment pallet in the S-2 warehouse at the same time. Therefore, incompatible wastes, or incompatible wastes and materials shall not be placed in the same container or on the same secondary containment pallet.

8.3.5 Management of Ignitable or Reactive Wastes in Tanks [R315-3-2.7 [40 CFR 270.16(f)] and R315-8-10 [264.198(a)(2)]]

8.3.5.1 Agent, brine, and spent decontamination solutions have flash points that classify them as Class IIIB liquids in accordance with the National Fire Protection Association. These are not unstable, ignitable or reactive liquids, as defined by the National Fire Protection Association (NFPA). The storage tanks are in full compliance with the NFPA requirements. The agent collection and spent decontamination tanks are located in the TOX and Spent Decontamination System Room, respectively. These areas are provided with trenches and sumps that provide containment in excess of the largest tank capacity. The spacing between tanks is in excess of three feet.

8.3.6 Management of Incompatible Waste in Tanks [R315-3-2.7 [40 CFR 270.16(f)] and R315-8-10 [264.199(b)]]

8.3.6.1 The design of the facility allows for brines from the PAS to go to the brine surge tanks in the BRA, spent decontamination solutions and miscellaneous liquid wastes from the sumps to go to the spent decontamination tanks, and agent from the process machines and miscellaneous liquids to go to the agent collection tanks. All pollution abatement system brines from all of the furnaces, whether processing GB, VX, or mustard, are compatible. Different agents are not processed together in the ACS tanks and when changing from one agent to another, the agent collection tanks are thoroughly decontaminated to less than 20 ppb.